any really large extent of land suitable for the growth of the cacao-plant. The rubber industry in Ceylon, as elsewhere, is mysteriously unproductive, while the cultivation of vanilla, pepper, and fibres, is only in the experimental stage. The total areas under the various cultivations at present are: tea, 183,000 acres; coffee (Arabian), 77,000 acres; coffee (Liberian), 916 acres; cinchona, 36,000,000 trees over two years old; cacao, 12,000 acres; cardamoms, 5000 acres; rubber-trees, 386 acres; croton, castor-oil, aloes, cinnamon, vanilla, pepper, cloves, plantains, and citronella grass, 7400 acres; gum-trees, fruit-trees, sapan, sapu, cocoa-nuts, areca-nuts, nutmegs, 4600 acres.

Such are a few of the gleanings from this useful account of the planting and agricultural industries of Ceylon. Mr. Ferguson is favourably known as a successful journalist, and as the author or joint-author of numerous publications connected with the island in which he has spent the greater part of his life. Indeed, it would not be too much to say that Mr. Ferguson and his uncle have contributed by their writings in no small degree to promote the various industries upon which the prosperity of Ceylon depends. To those whose interest or whose business is connected with tropical cultures this summary will prove most useful. It covers a wide field, but, so far as Ceylon is concerned, it contains information available in no other way. The historical and statistical facts, no less than the points respecting the treatment of tropical plants, are collected from trustworthy sources, and are of interest wherever such plants are cultivated, and we may add scarcely a single tropical product is passed unnoticed. D. M.

PALÆONTOLOGY.

Die Stämme des Thierreiches. Von M. Neumayr. "Wirbellose Thiere." Erster Band. (Wien und Prag: Tempsky, 1889.)

THE palæontologist has been defined as a variety of naturalist who poses among geologists as one learned in zoology, and among zoologists as one learned in geology, whilst in reality his skill in both sciences is diminutive. The division of zoology into palæontology and neontology is one which is, no doubt, logically defensible, and so would be a division of the subject-matter of zoology into as many branches as there are periods recognized by geologists—cambriontologists, siluriontologists, anthrakontologists, &c. On the other hand, it must be admitted that such divisions seem unlikely to tend to the furtherance of our knowledge of animal life in the past. The fragmentary remains of extinct animals can only be interpreted by the application to them of a very thorough knowledge of the form and structure of living animals, and accordingly it would seem desirable that, as is more usually the case in regard to the study of plant remains than in regard to that of animal remains, the study of palæontology should be relegated to those who also occupy themselves with neontology. The botanists, with few exceptions, pursue this plan; but curiously enough, a special class of palæontological zoologists exists and flourishes. A further advantage to be derived from the suppression of palæontologists seems to be this—that there would be a better chance for the cultivation of true geology, which now, to some extent, has its professorial positions, its museums, and its publications invaded by these specialists. Whatever may be said in favour of the palæontologist, he cannot be allowed to claim geology as his own; nor should the capable geologist, as is unfortunately and so frequently the case, venture beyond his last, and discourse on zoology in the disguise of a palæontologist, for the disguise cannot effectually conceal his incompetency to deal with zoological problems.

Whilst believing that it is increasingly desirable that the truth of the above propositions should be recognized and acted upon, we are yet prepared to admit that, as a practical division of labour in the great field of zoological science, palæontology must be recognized. Human knowledge does not develop according to abstract conceptions of the relations of one branch of study to another, but on a much more homely basis, open to philosophical objections of the most severe character. The way in which things have presented themselves to the hands and minds of students in consequence of practical demands or special opportunities of study is that which has determined the existence of the various divisions of natural history and the consequent groups of naturalists devoted to one or another unphilosophically limited pursuit. The collecting of "fossils," the hammering out of the fragments of a past world from their stony graves, the cultivation of the faculty of recognizing the significance of minute and detailed portions of fossilized shells and bones, is a definite hobby, which has excited the enthusiasm and stimulated the ingenuity of a long list of remarkable men, such as Woodward, Mantel, Barrande, and a host of less-known collectors. It seems not improbable that, were the remains of extinct animals in our great public and educational collections classified and placed with those of recent forms, an injustice, not to say an injury, would be done to the special phase of scientific activity which has produced these collections, and the important knowledge of the history of life on the earth which they represent. The morphologist, dealing with the complete structure of recent forms, is liable to neglect all but the more perfect remains brought to light by the collector of fossils; whilst, on the other hand, the palæontologist interprets the most obscure fragments, and speculates, it may be audaciously, but not unwisely, upon the significance of all that comes to his hand.

The volume which has led to these remarks is the first part of a treatise which is improperly named. It is not a treatise upon the pedigree of the animal kingdom, but an account of extinct animals treated in zoological order—in fact, a manual of palæontology. As an introduction, there is an extensive essay on Darwinism, and a discussion of Lamarckism and the causes of variation, which are becoming more and more the absorbing topics of the day. Dr. Neumayr does not appear to make any contribution of general importance to the discussion; but he makes the doctrine of descent and the Darwinian theory of natural selection the guiding principles of his treatise. The neontologist, if we may venture to call anyone by that name, will find in Dr. Neumayr's pages many facts of great value in the elucidation of biological problems, and a number of excellent woodcuts. The work promises to be one of considerable size, since this first volume consists of six hundred pages royal

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octavo. It is written from the point of view of the author's nationality, and naturally such new matter as it contains is chiefly in reference to the palæontology of the Austrian Empire. E. R. L.

OUR BOOK SHELF.

Text-book of Physiography. By Edward Hull, M.A., LL.D., F.R.S. (London: Deacon and Co., 1888.)

FROM the Director of the Irish Geological Survey we should naturally expect a text-book of exceptional merit, but we must confess at the outset that he has disappointed us. In the first place, he does not seem to have a clear conception as to the scope of his subject. Physiography is essentially an introduction to the study of natural forces and their effects, and consequently not only comprises the various movements and physical features of the earth, but also includes a study of the various forms of energy and the properties of matter. Of the latter, Prof. Hull has written nothing. Again, it is difficult to see for what class of students the book has been written. It is evidently not for beginners, being avowedly addressed to those who have access to the Transactions of the learned Societies; and the treatment is far too superficial for advanced students.

The first part of the book is designated "Astronomical and Introductory," the earth being considered in relation to the other planets. The questions of latitude and longitude, and a chapter on the moon, fall under this head. This part of the subject is treated so briefly that very careful reading will be necessary on the part of those who are not previously acquainted with it.

Part II. deals with "Terrestrial Physics and Dynamics," and discusses the form and structure of the earth, volcanoes, and earthquakes. The theory of a viscous stratum beneath the earth's crust is put forward as confidently as if it were the law of superposition of strata, and all reference to the objections which have been urged against it is omitted. It would be hard to compress more debatable matter into a page than has been effected in the diagram which illustrates this theory (p. 55).

The physical features of the globe, such as surface forms, oceans, coral islands, tides, air currents, and the functions of rivers and glaciers, are treated in Part III. Terrestrial magnetism also falls under this head, and this is really an excellent outline of the subject, as far as results go; but practically nothing is said about the instruments which are employed. As a compromise between the views of Darwin and Murray regarding coral reefs, Prof. Hull suggests (p. 110) that "the volcanic islands and banks of organic materials are themselves planted on a floor formed by the surface of a continent, which once occupied the region of the Central and Western Pacific." We will leave the opposing parties to form their own opinions as to the value of this suggestion.

The geographical distribution of plants and animals forms the subject of Part IV., and here there is little to complain of.

The book is illustrated with thirteen coloured plates and maps, and eleven diagrams. Some of these, as, for example, the map showing the lines of equal magnetic variation and declination for the British Isles, are excellent. The whole book bears traces of having been written hastily, and we cannot but regret that the author of "The Coal-fields of Great Britain" should have added one more to the already too large number of text-books that seem to present physiography as a subject in which no originality is possible.

The Clyde, from its Sources to the Sea. By W. J. Millar, C.E. (London: Blackie and Sons, 1888.)

MR. MILLAR has succeeded in writing an interesting book about the Clyde, and about Glasgow in particular. The subject is worthy of the care devoted to it by the author, for what river or city in the United Kingdom has more varied industries to boast of, and where are the applications of science more numerous?

Probably no river owes its improvements more to the engineer than the Clyde. We are told how eminent engineers were called in, and surveys made, in order to deepen the river and make it more navigable; Smeaton and James Watt each had their turn, and afterwards many well-known men in their time reported on the same subject. The result is that the Clyde of to-day is able to float the largest ocean steamers in its harbour, a state of things of which the people of Glasgow are justly proud.

The growth of the steam-ship, of course, occupies much space, since it was on the Clyde the first successful attempts at steam navigation were made. These are duly described, and the boats illustrated. On recent Clyde-built ships our author has much to say, and, among other things, he gives an account of some experiments conducted by the late Mr. William Denny to investigate the relation existing between speed and resistance of ships. Messrs. Denny, at their ship-building yard at Dumbarton, have constructed an experimental tank with all the requisite machinery for the purpose, thus carrying on the investigations initiated by the late Dr. Froude.

This volume gives one a good insight into the varying industries carried on in Glasgow and its neighbourhood, and contains much general information about the district. The book is well written, nicely printed and illustrated, and should find a place in the libraries of the citizens of St. Mungo, and others interested in the progress of the district.

A Playtime Naturalist. By Dr. J. E. Taylor, F.L.S. (London: Chatto and Windus, 1889.)

DR. TAYLOR explains that he has a liking for intelligent English lads, "just as some people have for blue china and etchings"; and he "ventures to think the former are even more interesting objects." Accordingly he has written this little book for the instruction and entertainment of his "human hobbies." The work contains abundant evidence of the author's knowledge and enthusiasm, and any boy who may read it carefully is sure to find something to attract him in the chapters on birds, Lepidoptera, land shells, toads, frogs, newts, invisible life, microscopic plants, and other subjects. The style is clear and lively, and there are many good illustrations.

LETTERS TO THE EDITOR.

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The Climate of Siberia in the Mammoth Age.

PROF. A. NEWTON, in his remarks on my letter, says that the similarity of the birds of Japan and of Europe has been long known. Of course it has. It is an elementary postulate in geographical zoology; but this is not the fact to which I called special attention, and from which I drew my inference. That fact is that, while the birds of Japan and England are in certain species undistinguishable, the corresponding birds of Siberia are sufficiently different to be classed as separate species. This could not be known, in the sense of being proved, until the avifauna of Siberia had been worked out from end to end, resulting in the formation of such a continuous series of skins as that in the possession of my friend Mr. Seebohm.

Prof. Newton goes on to argue that the remarkable fact here referred to is to be explained by the hypothesis that the birds of

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